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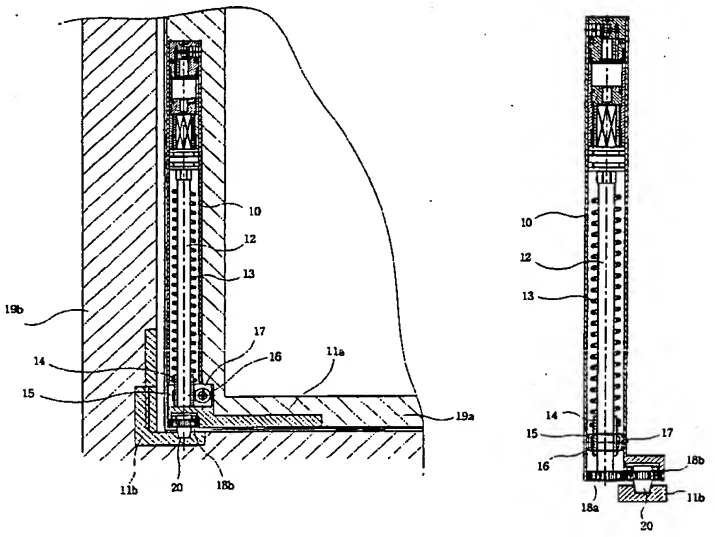
(54) Title: A CONTROLING APPARATUS FOR TENSION OF AUTO-HINGE



(57) Abstract: Disclosed herein is an elasticity control device for automatic hinges. This elasticity control device for automatic hinges includes a cylindrical housing (10), a shaft (12) axially set in the housing (10), a torison coil spring (13) fitted over the shaft (12) to apply a restoring force to the shaft (112), an elasticity control unit (14) provided at a lower end of the torsion coil spring (13) for controlling elasticity of the spring (13), and a hydraulic speed regulating unit connected to an upper end of the shaft (12) for controlling a rotation speed of the shaft (12). The elasticity control unit (14) has a worm wheel (15) connected to the lower end of the torsion coil spring (13), and a worm (16) installed in the housing (10) and engaging with the worm wheel (15). The worm (16) also has a maninpulation hole (17) at an end of its shaft (12) for allowing a user to rotate the worm (16).

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A CONTROLING APPARATUS FOR TENSION OF AUTO-HINGE

Technical Field

The present invention relates generally to an automatic hinge, which is installed on an automatic door or a fire door so as to easily open the door with a small force when pushing the door as well as to slowly close the door by a restoring force of a spring when releasing the door, and more particularly, to an elasticity control device for the automatic hinge, which uses a worm gear for controlling the elasticity of a torsion coil spring, thereby quickly, easily and finely controlling the elasticity thereof.

Background Art

Generally, automatic doors have been widely used for fire doors shielding spaces inside the doors so as to prevent fires from being spread or to retard the spread of the fires, and for other gates, thus easily opening the doors with a small force as well as automatically and slowly closing the doors.

Such a function is accomplished by means of an automatic hinge installed on the lower portion of the door. As shown in Fig. 1, the automatic hinge includes a cylindrical housing 1, a shaft 2, a torsion coil spring 3, and an elasticity control unit 4. The shaft 2 is axially set in the housing 1. The torsion coil spring 3 is fitted over the shaft 2. The elasticity control unit 4 is provided at the upper end of the torsion coil spring 3 and has a plurality of elasticity control holes 5 regularly formed on its outer circumferential surface. An opening is formed on the sidewall of the housing 1 such that the elasticity control holes 5 are exposed to the outside through the opening. A stop pin 6 is removably inserted in an elasticity control hole 5 through the opening to stop the elasticity control unit 4 at a position where the elasticity control hole 5 is aligned with one end of the opening,

thus maintaining a controlled elasticity of the spring 3. A hydraulic speed-regulating unit is connected to the upper end of the shaft 2 and controls the rotation speed of the shaft 2.

The opening and closing speed of the door is sometimes required to be controlled after installing the automatic hinge in the door. For controlling the opening and closing speed of the door, the elasticity control unit 4 having the elasticity control holes 5 must be rotated to control the elasticity of the torsion coil spring 3.

When it is required to control the elasticity of the torsion coil spring 3, a user inserts a jig into the elasticity control hole 5 and rotates it until the spring 3 reaches a predetermined degree of elasticity. Thereafter, the stop pin 6 is inserted into the elasticity control hole 5 to stop the elasticity control unit 4. But it is difficult to control the elasticity of the torsion coil spring 3 in this way. Furthermore, a big force is needed to control the elasticity of the torsion coil spring 3. In addition, intervals between the elasticity control holes 5 are large, so it is impossible to finely control the elasticity of the torsion coil spring 3.

Disclosure of the Invention

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide an elasticity control device for automatic hinges, which uses a worm gear for controlling the elasticity of a torsion coil spring, thereby quickly, easily and finely controlling the elasticity thereof.

In order to accomplish the above object, the present invention provides an elasticity control device for automatic hinges, which includes a cylindrical housing, a shaft axially set in the housing, a torsion coil spring fitted over the shaft to apply a restoring force to the shaft, an elasticity control unit provided at the lower end of the torsion coil spring and controlling the elasticity of the spring, a hydraulic speed regulating unit connected to the upper end of the shaft and

controlling a rotation speed of the shaft, wherein the elasticity control unit has a worm wheel connected to the lower end of the torsion coil spring, and a worm installed in the housing, engaging with the worm wheel, and having a manipulation hole at an end of its shaft for allowing a user to rotate the worm.

Brief Description of the Drawings

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view showing a conventional automatic hinge;

Fig. 2 is a sectional view showing the construction of an elasticity control device for automatic hinges according to the present invention; and

Fig. 3 is a side sectional view of the elasticity control device for automatic hinges of this invention.

Best Mode for Carrying Out the Invention

Reference now should be made to the drawings, in which the same reference numerals are used throughout the different drawings to designate the same or similar components.

As shown in Figs. 2 and 3, an automatic hinge of the present invention is vertically installed in a hinge mount in the lower portion of a door 19a. The automatic hinge includes a cylindrical housing 10 enclosing elements of the automatic hinge, and a bracket 11a positioned on the lower portion of the housing 10 and screwed to the door 19a. The housing 10 accommodates a shaft 12, a hydraulic speed-regulating unit, a torsion coil spring 13, and an elasticity control unit 14. The shaft 12 is rotatable independent of the housing 10. The hydraulic speed-regulating unit is connected to the upper end of the shaft 12 and controls the rotation speed of the shaft 12. The torsion coil spring 13 is fitted over the shaft

12 so as to apply a restoring force thereto. The elasticity control unit 14 is provided at the lower end of the torsion coil spring 13.

A pinion 18a is installed at the lower end of the shaft 12 and engages with a pinion 18b. The pinion 18b is installed on the upper end of a hinge shaft 20 held in a doorframe 19b. The reference numeral 11b denotes a bracket fixed to the doorframe 19b for supporting the hinge shaft 20.

The elasticity control unit 14 has a worm wheel 15 connected to the lower end of the torsion coil spring 13, and a worm 16 installed in the housing 10 so as to engage with the worm wheel 15.

The door 19a is partially cut out, so an end of the shaft of the worm 16 is exposed to the outside. A manipulation hole 17 is formed at the end of the shaft of the worm 16 to allow a user to reach the shaft of the worm 16 and rotate the shaft by means of a wrench or a screwdriver.

The torsion coil spring 13 is twisted when opening the door 19a of this invention. The door 19a is automatically closed by the elasticity of the torsion coil spring 13 when releasing the door 19a. Further, the door 19a is slowly closed by the hydraulic speed-regulating unit connected to the upper end of the shaft 12.

When it is required to control the elasticity of the torsion coil spring 13 applying a restoring force to the shaft 12, the user inserts a wrench or a screwdriver into the manipulation hole 17 to rotate the shaft of the worm 16.

In this way, the rotation of the worm 16 makes the worm wheel 15 rotate. The rotation of the worm wheel 15 also makes the shaft 12 integrated therewith rotate, thus quickly and easily twisting or releasing the torsion coil spring 13 to increase or reduce the elasticity of the spring 13.

Industrial Applicability

As described above, the present invention provides an elasticity control device for automatic hinges, which uses a worm engaging with a worm wheel and allows a user to rotate the worm through a manipulation hole when it is required to

increase or reduce the elasticity of a torsion coil spring, thereby easily controlling the elasticity of the spring with a small force, and allowing a door to have a good appearance since only the manipulation hole is exposed to the outside.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. An elasticity control device for automatic hinges, comprising a cylindrical housing, a shaft axially set in said housing, a torsion coil spring fitted over said shaft to apply a restoring force to the shaft, an elasticity control unit provided at a lower end of said torsion coil spring for controlling elasticity of the spring, a hydraulic speed regulating unit connected to an upper end of said shaft for controlling a rotation speed of the shaft,

wherein said elasticity control unit comprises a worm wheel connected to the lower end of the torsion coil spring, and a worm installed in the housing and engaging with the worm wheel, said worm having a manipulation hole at an end of its shaft for allowing a user to rotate the worm.

FIG.1

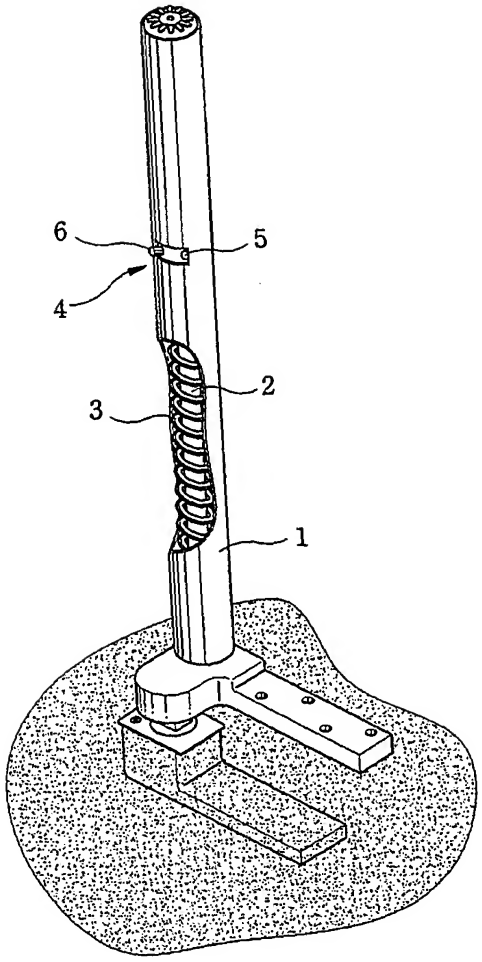


FIG.2

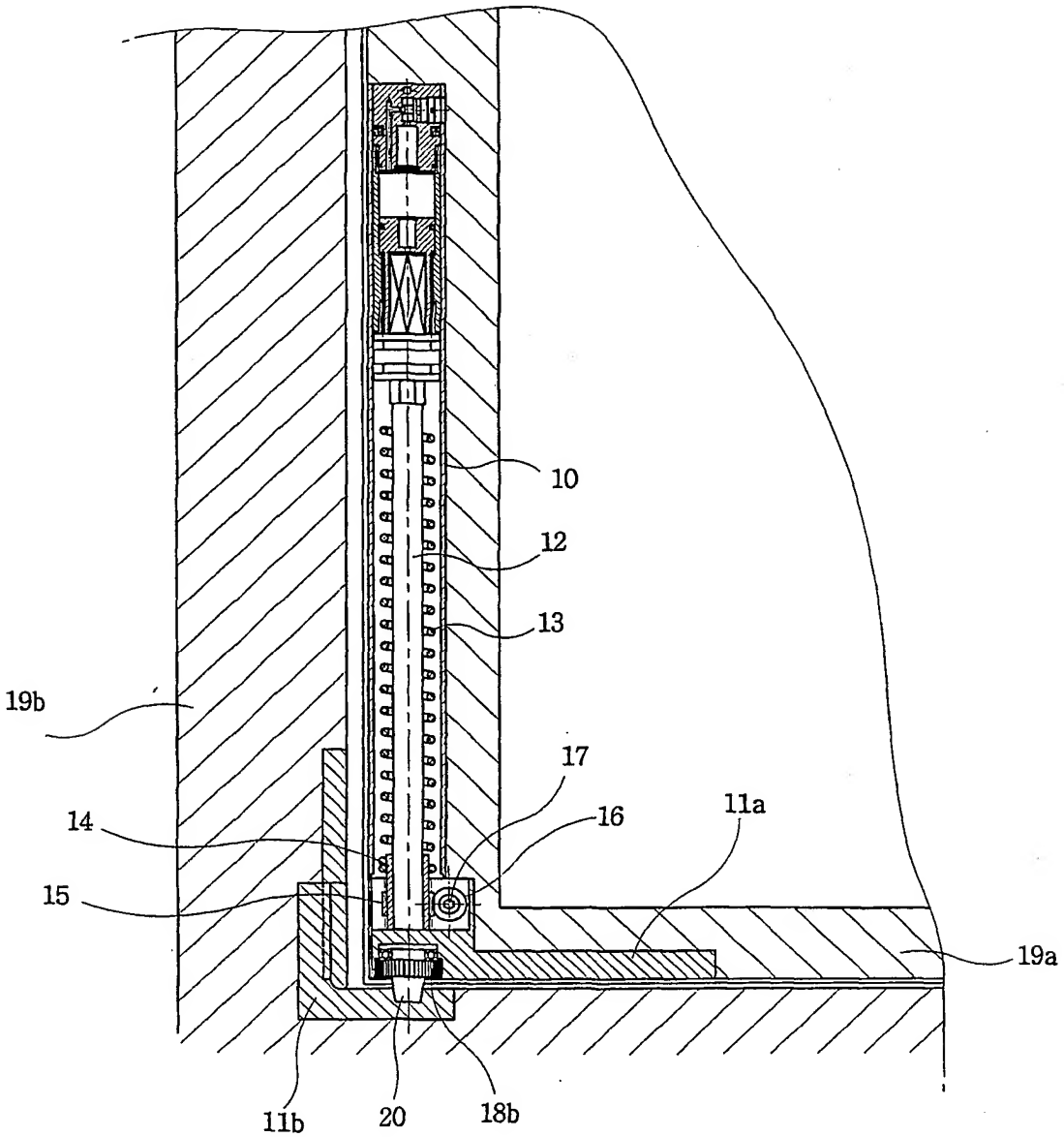
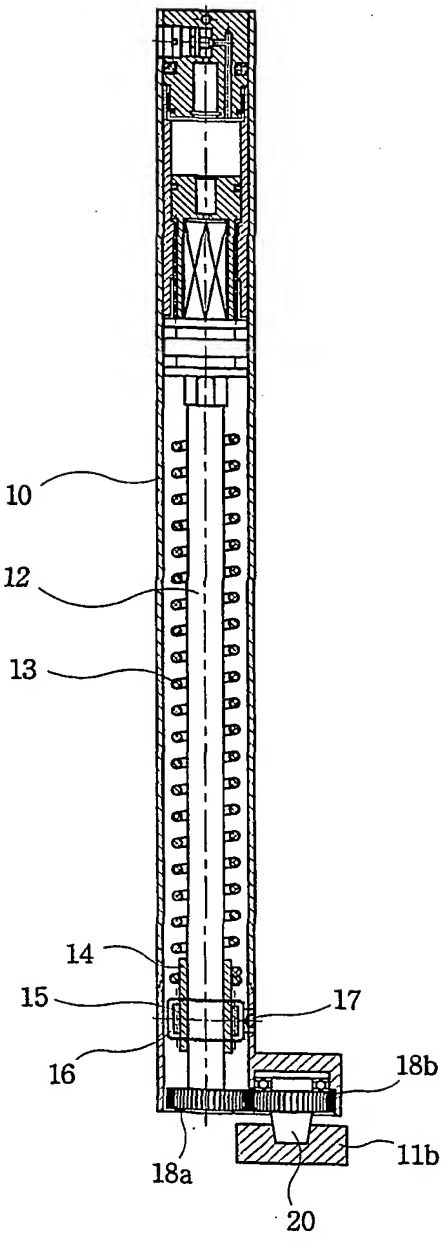


FIG.3



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

IPC7 E05F 3/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 E05F 3/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4951351 A(ECKEL INDUSTRIES INC.) 28 AUGUST 1990	1
A	JP 8-184254 A(TOKUBEARINGKU CORP.) 16 JULY 1996	1

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☐ See patent family annex.

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